

TOTAL LIFE CYCLE (TLC) INTEGRATED METRICS PACKAGE

WHY METRICS FOR TOTAL LIFE CYCLE SYSTEMS MANAGEMENT?

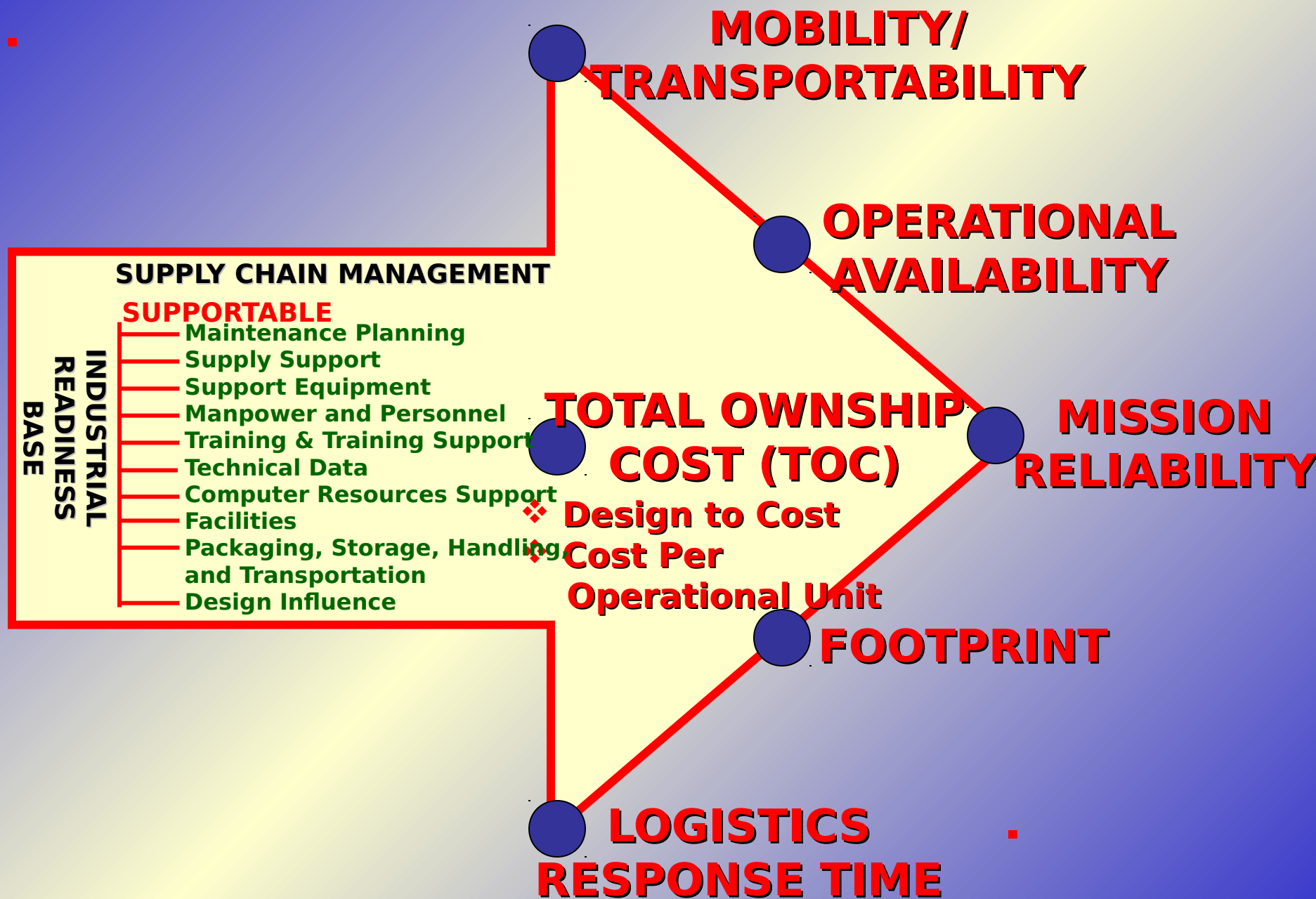
- **It's a sound business practice**
- **Joint Logistics Board (JLB) Memo
13 Jan 03, JLB Balanced Scorecard
Metrics Tasking**
- **Defense Business Board (DBB)
Recommendations**
- **Deputy Secretary of Defense Memo
4 Feb 04, Implementation of BDD
Recommendations to the SEC**

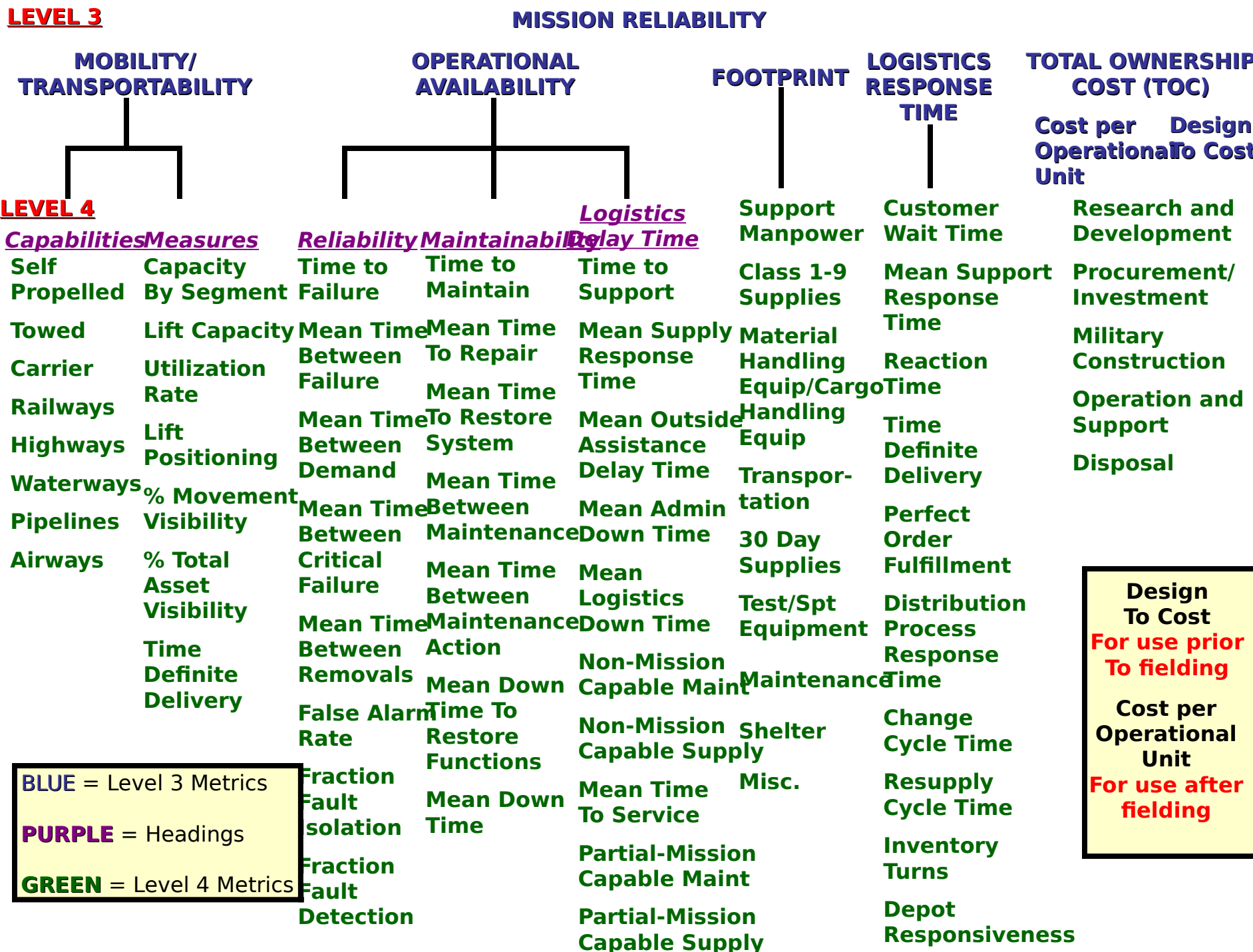
ASSUMPTIONS

- Integrated Logistics Support (ILS) is Our Process for Planning and Executing Product Support
- There is no need for a separate set of metrics for an Organic or Contract PBL
- All OSD reporting will be linked to the level 3 performance metrics.

LEVEL 3 METRICS

- Operational Availability (Ao)
- Mission Reliability
- Total Ownership Cost (TOC)
 - Design to Cost (Measure Prior to Fielding)
 - Cost per Operational Unit (Measure Post Fielding)
- Response Time
- Footprint
- Mobility/Transportability





$$A_i = \frac{MTBF}{MTBF + MTTR}$$

$$A_a = \frac{MTBM}{MTBM + MTTR}$$

$$A_o = \frac{MTBM}{MTBM + MDT}$$

Ships

$$K'' = K' - \frac{MTTR + MLDT}{MTBF}$$

$$A_o = \frac{K'' (MTBF)}{K'' (MTBF) + MTTR + MLDT}$$

Predictive Operational Availability

$$A_o = \frac{MTBF}{MTBF + MTTR + MLDT}$$

Impulse Systems

$$A_o = \frac{\text{Number of Successes}}{\text{Number of Attempts}}$$

Aircraft

$$A_o = 1 - \frac{MTTR + MLDT}{K' (MTBF)}$$

$$K' = \frac{\text{Total Calendar Time}}{\text{Total Operation Time}}$$

Measured Operational Availability

$$A_o = \frac{MTBF}{MTBF + MDT}$$

Continuous Use Systems

$$A_o = \frac{MTBF}{MTBF + MTTR + MSRT + MOADT + MAdmDT}$$

$$\text{NOTE: } MLDT = MSRT + MOADT + MAdmDT$$

Aircraft (Dr. Rice)

$$A_o = \frac{MTBF}{MTBF + MTTR + MLDT + TAT}$$

MTBF = Mean Time Between Failure

MTBM = Mean Time Between Maintenance

MLDT = Mean Logistics Delay Time

MSRT = Mean Supply Response Time

MAdmDT = Mean Administrative Delay Time

Ai = Inherent Availability

MTTR = Mean Time To Repair

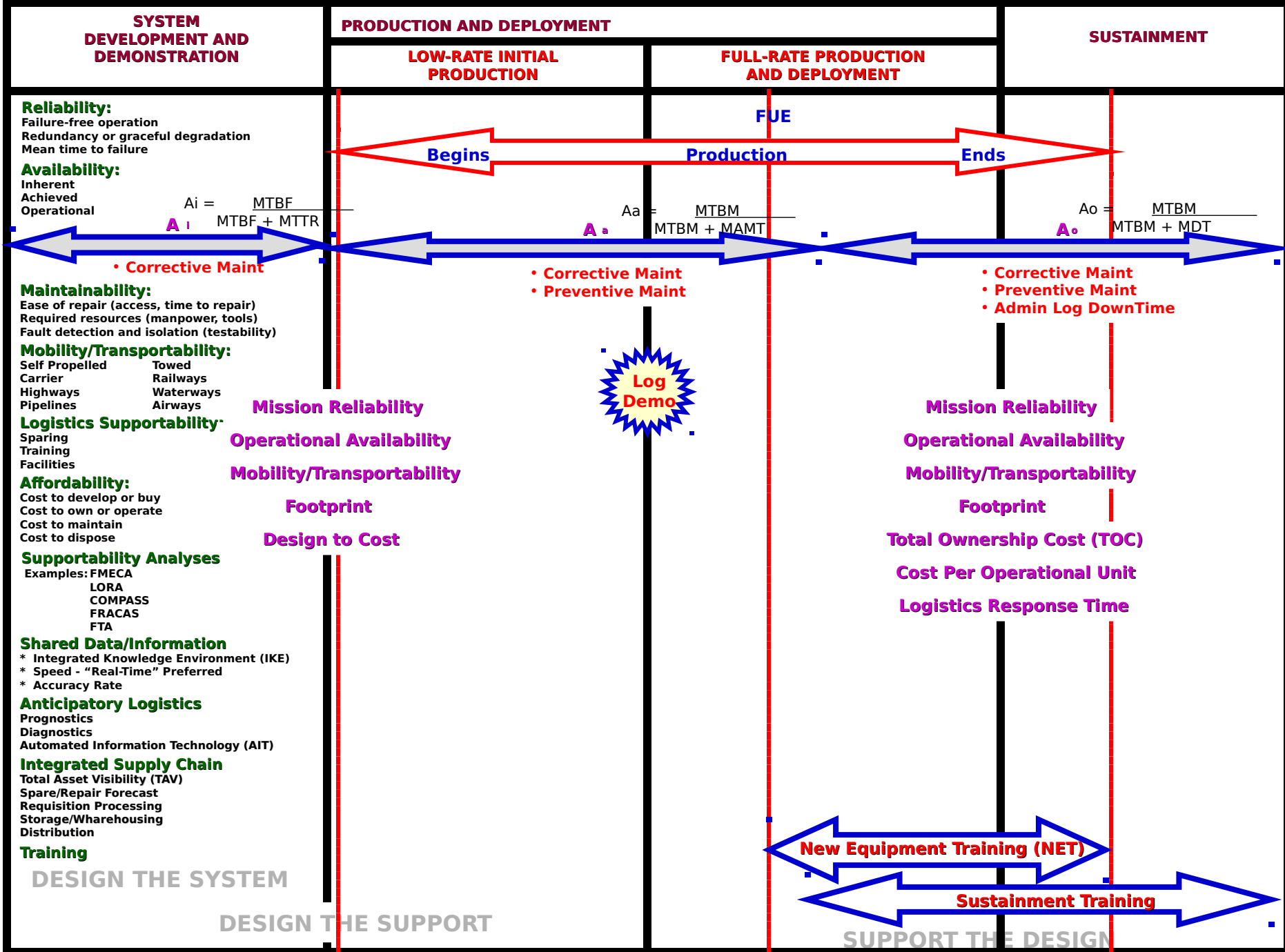
MDT = Mean Down Time

TAT = Turn-Around-Time (Aircraft)

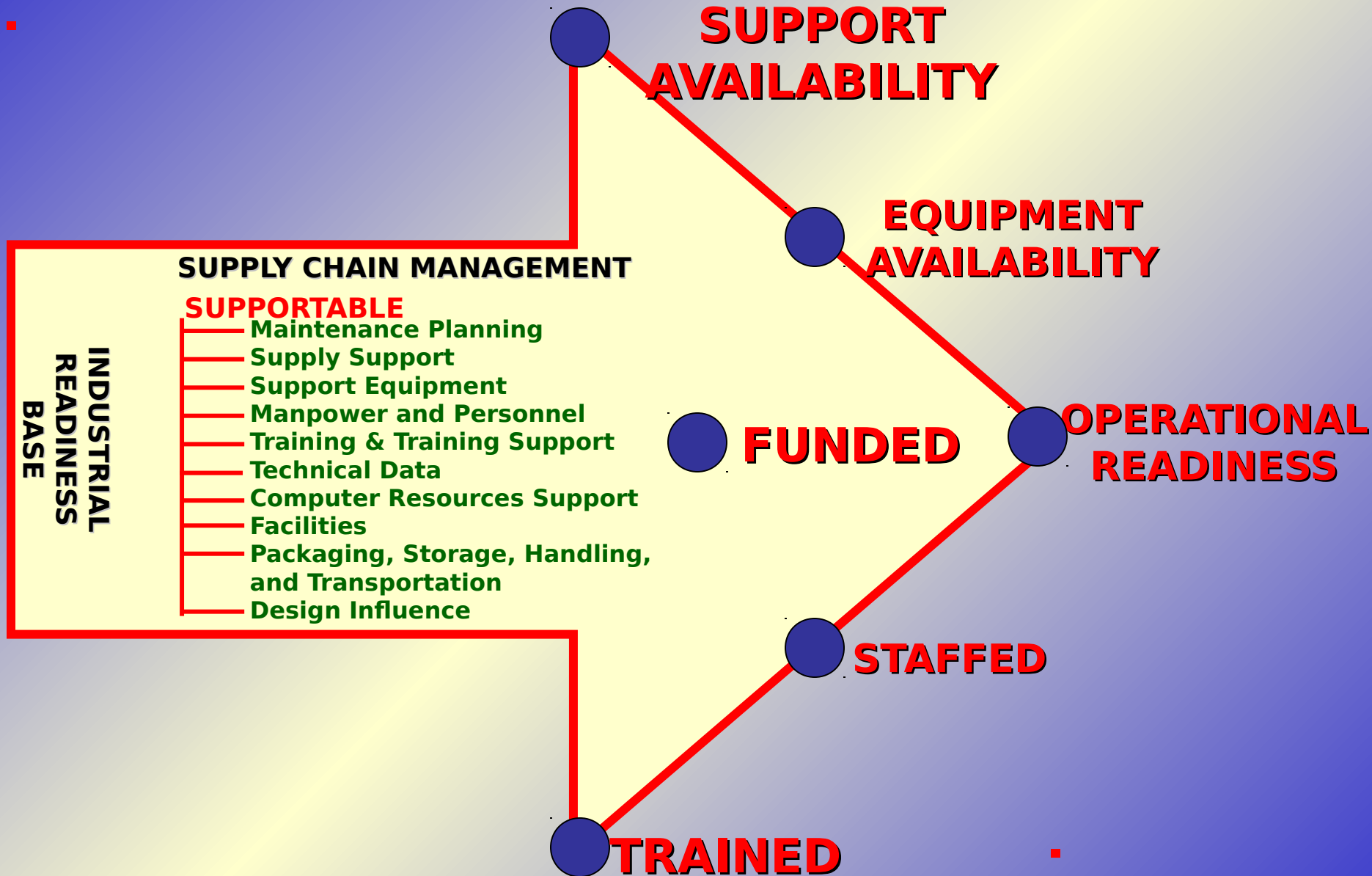
MOADT = Mean Outside Assistance Delay Time

Aa = Achieved Availability

Ao = Operational Availability



BACK-UP SLIDES



EQUIPMENT AVAILABILITY

Point Availability
(state of functioning - given point in time)

Interval Availability
(state of functioning - over a stated period of time)

INHERENT
(Reliability & Active Maintenance)

ACHIEVED
(Reliability, Scheduled & Unscheduled Maintenance)

OPERATIONAL
(Reliability, Scheduled, Unscheduled Maintenance,
Plus Logistics Delay Time)

RELIABILITY
Reparable
(Time Between Failure (MTBF))
Expendable
(Time To Failure (MTTF))

Maintenance Free Operating Period (MFOP)
(Period of operation...item carries out all missions without
operator being restricted due to faults or limitations with
Minimum of maintenance)

MAINTAINABILITY
Time To Repair (MTTR)
Preventive
(Reduce Likelihood of Failure)
Scheduled
Corrective (Repair)
(Unscheduled)

Maintenance
(3 basic elements)
• Preparation Time
• Active maintenance Time
• Delay Time (Logistics Time)

Active Repair Time
• Preparation Time
• Malfunction Verification Time
• Fault Location Time
• Part Procurement Time
• Repair Time
• Final Test Time

LOGISTICS DELAY TIME

ADMINISTRATIVE DELAY TIME

OPERATIONAL READINESS (OR)

SUPPORTABLE (Footprint)

- Maintenance Planning
- Supply Support
- Support Equipment
- Manpower and Personnel
- Training & Training Support
- Technical Data
- Computer Resources Support
- Facilities
- Packaging, Storage, Handling,
and Transportation
- Design Influence

TRAINED

- TRAINERS
- SIMULATORS
- TRAINING DEVICES
- TRAINING AIDS
- NEW EQUIPMENT TRAINING (NET)

Operator
Maintainer
Transporter

INSTITUTIONAL TRAINING

Operator
Maintainer
Transporter

EMBEDDED TRAINING

Operator
Maintainer
Transporter

DISTANCE LEARNING

Operator
Maintainer
Transporter

STAFFED

OPERATION

- Quantity
- Skill Level
- Position

Military Officer
Military Warrant Officer
Military Enlisted
Federal Civilian
Contractor

MAINTENANCE

- Quantity
- Skill Level
- Position

Military Officer
Military Warrant Officer
Military Enlisted
Federal Civilian
Contractor

TRANSPORTATION

- Quantity
- Skill Level
- Position

Military Officer
Military Warrant Officer
Military Enlisted
Federal Civilian
Contractor

TRAINERS

- Quantity
- Skill Level
- Position

Military Officer
Military Warrant Officer
Military Enlisted
Federal Civilian
Contractor

OTHERS

- Quantity
- Skill Level
- Position

Military Officer
Military Warrant Officer
Military Enlisted
Federal Civilian
Contractor

FUNDED

TOTAL OWNERSHIP COST (TOC)

COST PER OPERATIONAL UNIT OF PERFORMANCE

RDTE

Design and Development
Product Test
Product Management
And Technical Direction

PROCUREMENT

Equipment
Stocks
Initial Training
Installation
Transportation
Technical Data

OPERATION AND SUPPORT

Equipment and Replacements
Maintenance And Support
Recurrent Training
Inventory Management
Management and Technical Data
Facilities
Operation Costs

MILITARY CONSTRUCTION

Housing
Training
Storage
Maintenance

DISPOSAL

OPERATIONAL READINESS (OR)

<u>AVAILABILITY</u>	<u>STAFFED</u>	<u>TRAINED</u>	<u>SUPPORTED</u>	<u>FUNDED</u>
	Operators Required	Trainers Required Trainers Available	Customer Wait Time	Total Ownership Cost (TOC)
Capabilities	Operators On-hand	Simulators Required Simulators Available	Number Logistics Demands	Cost per Operation Unit of Performance
Readiness	Operators Trained		Repair Cycle Time	
Maintainability	Maintainers Required	Training Devices Required Training Devices Available	Response Time	
	Maintainers On-hand	Training Aids Required Training Aids Available		
	Maintainers Trained			
Logistics Delay Time	Transporters Required	New Equipment Training Courses Required		
Admin Delay Time	Transporters On-hand	New Equipment Training Courses Provided		
	Transporters Trained	Number of Students Trained		
	Others Required	Institutional Training Courses Required		
	Others On-hand	Institutional Training Courses Provided		
	Others Trained	Number of Students Trained		
		Embedded Training Available		
		Distance Learning Available		
		Unit Training Conducted		